What is claimed is:

1. A method for optically inspecting a sample, the method comprising:

obtaining empirical optical response information describing the diffraction resulting from the interaction of a probe beam with the sample;

defining a model for the sample, where the model includes one or more control points, the control points collectively defining the cross-sectional profile of at least one layer within the sample;

evaluating the model to obtain calculated optical response information predicting the diffraction resulting from the interaction of the probe beam with the sample; and

comparing the empirical optical response information and the calculated optical response information to determine the accuracy of the model.

2. A method as recited in claim 1 where at least one control point is a thickness control point and defines a layer thickness within the model.

3. A method as recited in claim 1 where at least one control point is a width control point and at least partially defines the width of the cross-sectional profile.

4. A method as recited in claim 1 that further comprises the step of using two or more control points to define a curve, the curve defining at least part of the cross-sectional profile.

5. A method as described in claim 1 that further comprises:

redefining the model by adjusting one or more control points;

reevaluating the model to minimize the difference between the empirical and calculated optical response information.

6. A method as described in claim 1 that further comprises:

providing a user with a visual display that includes a representation of the model as well as the empirical and calculated optical response information;

accepting interactive commands from the user to modify the model;

reevaluating the interactively modified model to obtain calculated optical response information predicting the diffraction resulting from the interaction of the probe beam with the sample; and

updating the visual display to reflect the calculated optical response information associated with the modified model.

7. A method as recited in claim 6 in which the user interactively modifies the model by changing the position of control points within the model representation.

8. A method for optically inspecting a sample, where the sample has a surface that includes a periodically repeating or isolated surface feature, the method comprising:

defining a cross-sectional profile for the surface feature, the shape of the cross-sectional profile defined by a set of two or more control points;

defining the thickness of each layer of materials included in the cross-sectional profile;

obtaining calculated optical response information predicting the diffraction resulting from the interaction of the probe beam with the sample by evaluating a model including the cross-sectional profile and defined thicknesses;

obtaining empirical optical response information describing the diffraction resulting from the interaction of a probe beam with the sample; and

comparing the empirical optical response information and the calculated optical response information to determine the accuracy of the model.

9. A method as recited in claim 8 where a thickness control points is used to define a thickness of at least one layer.

10. A method as recited in claim 8 that further comprises the step of defining the thickness of each layer of materials that is not included in the cross-sectional profile.

11. A method as recited in claim 8 where at least one control point is a width control point and at least partially defines the width of the cross-sectional profile.

12. A method as recited in claim 8 that further comprises the step of using two or more control points to define a curve, the curve defining at least part of the cross-sectional profile.

13. A method as described in claim 8 that further comprises:

redefining the model by adjusting one or more control points;

reevaluating the model to minimize the difference between the empirical and calculated optical response information.

14. A method as recited in claim 8 where the steps of defining a cross-sectional profile and defining the thickness of each layer of materials included in the cross-sectional profile are performed by moving control points within a graphic representation of the sample.

15. A method for optically inspecting a sample, where the sample has a surface that includes a periodically repeating or isolated surface; the method comprising:

interactively choosing the location of one or more control points within a graphic representation of the model to define to a cross-sectional profile for the surface feature;

interactively choosing the location of one or more control points within a graphic representation of the model to define the thickness of each layer of materials included in the cross-sectional profile;

obtaining calculated optical response information predicting the diffraction resulting from the interaction of the probe beam with the sample by evaluating a model including the cross-sectional profile and defined thicknesses;

obtaining empirical optical response information describing the diffraction resulting from the interaction of a probe beam with the sample; and

comparing the empirical optical response information and the calculated optical response information to determine the accuracy of the model.

16. An apparatus for optically inspecting a sample, where the sample has a surface that includes a periodically repeating or isolated surface; the apparatus comprising:

a first module configured to allow a user to interactively choose the location of one or more control points within a graphic representation of the model to define to a cross-sectional profile for the surface feature;

a second module configured to evaluate the model to obtain calculated optical response information predicting the diffraction resulting from the interaction of the probe beam with the subject; and

a third module configured to visually portray the difference between the calculated optical response information and empirical optical response information obtained for the subject.